

## Method and arrangement for the electrical release of mechanically stored power for unlocking

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### Abstract of DE4326313

The object of the invention is the mechanical unlocking, for example, of door locks on motor vehicles following the end of an accident. For this purpose, the necessary mechanical energy is obtained by means of the release of a pre-tensioned spring. Release is carried out as a result of severing a fusible point by means of a short electrical fusing current surge, which is taken from an electrical store. Vibration sensor, retriggerable switching electronics, store and reverse flow diode can be assigned individually to each fusing point and thus to each door lock, since these parts are of small construction and are cheap. As a result, in the case of failure of the on-board power supply, caused by an accident, each door lock can be unlocked independently of the others. This is only possible since only very short-term low electrical energy is needed for the fusion process, while the energy released in the pre-tensioned spring effects the mechanical unlocking actuation.

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TRANSLATION

Disclosure  
DE 43 26 313 A1

Federal Republic of Germany  
German Patent Office:

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Same as applicant.

- (54) Procedure and Arrangement of Electrical Release of Mechanically Stored Energy for Unlocking
- (57) Procedure and arrangement for electrical release of mechanically stored energy for unlocking. The task of the invention is to provide a mechanical unlocking device, for example, of door locks on motor vehicles after an accident has occurred. The necessary mechanical energy is achieved by releasing a pre-tensioned spring. The release is accomplished by severing a fusible point by means of a short electrical fusing current surge, which is taken from an electrical storage device. Vibration sensor, re-triggerable switching electronics, storage reservoir and return diode can be assigned to each fusing point and thus to each door lock, because these parts are small in size and are inexpensive. In this way, each door lock can be unlocked individually if there is a power failure caused by an accident. This is possible because only a small amount of electrical energy is needed for a brief time for the fusing process, whereas the energy released in the pre-tensioned spring causes mechanical actuation of the unlocking process.

## Description

### Known Information

Several procedures and arrangements are known for unlocking vehicle doors, in particular in the case of an accident. However, these usually involve significant disadvantages. The most significant disadvantages include premature unlocking during the movement process, failure of the lock due to power failure and unwarranted unlocking from vibration, which has not been caused by an accident.

### Invention Concept

Unlocking must occur for each individual door and with every system assigned to the door, without the failure of the electric power supply interfering with the unlocking process. Unlocking must not occur already during movement caused by the accident, but rather, only after the final rest position is reached.

The invention designates the following parts and functions for this purpose:

Mechanical unlocking must occur with mediums, which as a result of their simplicity have minimum susceptibility to interference or time-related effects, such as corrosion, as a result of accident-related causes. It is planned to mount a mechanical spring in such a way so that the energy saved in it suffices to release any type of lock if the lock of the mounted spring is released electrically. The simplest planned effect of release is provided by means of a specified fusing point. The spring is held in the mounted position by a fusing point, which is designed in such a way that the brief but strong discharge current of an electrical storage reservoir causes the fusing and thus, the most simple release. A chemical capacitor, a non-chemical capacitor or a chargeable arrangement of cells of a known type are planned as electrical storage medium, depending on the expense framework and sought service life. Due to its optimal consistency, a MP capacitor is preferred.

A catch, actuated by a discharge current surge, is provided for electrical release of the spring. However, several failure sources are unavoidable, which do not adhere to the specified fusing point, for example, sticking, corrosion, gluing or bending.

Because the unlocking must not occur prematurely, an electrical arrangement is planned, which first provides the unlocking signal a few seconds after the accident-induced motion sequence. A so-called re-triggerable electrical arrangement is provided, which causes, for example, that several consecutive surges within the planned delay time cause a new start of the delay time and thus, the transmission of the unlocking signal is prevented until no further surge occurs. In this way it is assured that unlocking cannot occur during the accident sequence, even if this happens over a longer time period. The electrical storage medium supplies the operating current for this electrical arrangement for this time period. It is therefore independent from a power supply failure.

The described components are combined in a closed sub-assembly with one sensor each due to the high function assurance provided. Each door, secured with such a compact sub-assembly for unlocking, functions independently from possible system destruction at another door or central point.

The components described for the invention are generally known state of the art technology, so that a detailed description is not necessary for the trained technician. Because a number of so-called crash sensors are known, the principles of which range from spatially small piezo-ceramic elements to a simple ball contact, the sensor is not the object of this invention.

With the large number of known unlocking systems, the invention only covers the supply of mechanical energy needed for unlocking in a simple and disturbance-proof design.

Because it may be an advantage for several reasons to charge the storage capacitor with something higher than power supply voltage, the doubling the electronic voltage and integrating the same into the sub-assembly is planned. This is a significant claim, especially in regard to EMC – electro-magnetic compatibility.

#### Patent Claims

1. Procedure and arrangement of electrical release of mechanically stored energy, including a sensor and an electrical system for processing and delay, characterized by the energy of a mechanically pre-tensioned spring being released by fusing a specified fuse point and actuating the unlocking process.
2. Procedure and arrangement per Claim 1 also characterized by an electric storage medium, a capacitor or a chargeable cell, being charged via a return flow diode from the power supply, so that the saved electrical energy feeds the electric system and the delay and causes the fusing of the specified fusing point, and that this stored electrical energy is dimensioned with adequate assurance even if the power supply fails.
3. Procedure and arrangement per the prior claims, also characterized by the power of the mechanically pre-tensioned spring being released by a brief surge of discharge current from the electrical reservoir by means of an electro-magnetically actuated catch.
4. Procedure and arrangement per the prior claims, further characterized by the unlocking of vehicle doors preferably occurring if there is damage.
5. Procedure and arrangement per the prior claims, characterized by a voltage doubler being provided, which charges the electrical reservoir to a higher voltage than the power supply and that the electrical and electronic components are operated at this higher voltage.
6. Procedure and arrangement per the prior claims, characterized by the target fusing point being formed by a wire, which on the one hand is fastened on the mounted

spring and on the other hand is held by an insulated clamp, and if necessary is drawn and clamped from the reserve roll after accidental fusing and unlocking.